

Memorandum

To: CHAIR AND COMMISSIONERS

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Action Item

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Ref: **ANNUAL REPORT ON SEISMIC SAFETY RETROFIT PROGRAM**

ISSUE:

In accordance with Government Code Section 8879.17 and Streets and Highways Code Section 180.10, the California Department of Transportation (Department) has developed a report on the progress of the seismic safety retrofit program of publicly owned highway bridges through the end of 2002. The Seismic Retrofit Bond Act of 1996 (Proposition 192), which was approved by the voters at the March 26, 1996, direct primary election, requires the Department to report annually the status of funds available for seismic retrofit projects and the expenditures of bond proceeds.

The Department's seismic safety retrofit program consists of four areas including Phase 1, Phase 2, Toll Bridges, and Local Program. Proposition 192 provides funding for Phase 2 and Toll Bridge projects. Phase 1 and Local Program improvements are funded from other funding programs. These programs are included here to provide a comprehensive view of the entire seismic safety bridge retrofit program at the Department.

Attachment(s)

Phase 1 Seismic Retrofit Program:

- Phase 1 seismic retrofit projects consist of a total of 1,039 bridges. All 1,039 bridges have had seismic safety retrofit work completed. The Phase 1 seismic retrofit work was completed in May 2000. There are a few outstanding arbitration settlements.
- Phase 1 consists of bridges that were determined to be the most critical bridges for seismic retrofit based on the Department's screening process. The total estimated cost for Phase 1 is \$1.08 billion. Phase 1 projects have been funded from State Highway funds from the State Highway Operation and Protection Program (SHOPP). The total expenditures to date are approximately \$1.07 billion. The remaining balance of \$10 million should be sufficient to complete the few remaining arbitration claim settlements in the Phase 1 program.

Phase 2 Seismic Retrofit Program:

- Phase 2 consists of bridges that were determined to need seismic retrofit based on additional screening in the Department's screening process. The total budget for Phase 2 is \$1.35 billion. The funds include \$1.21 billion in Proposition 192 funds and \$0.14 billion in State Highway funds (expenditures prior to passage of Proposition 192). A total of \$1.152 billion has been allocated and awarded for capital outlay and support expenditure costs.
- Phase 2 seismic retrofit projects consist of a total of 1,155 bridges. A total of 1,136 bridges (representing 98.4 percent) have had seismic safety retrofit work completed. Phase 2 has 14 bridges remaining in design and five bridges under construction. The remaining bridges will be completed at various times over the next few years. There are three major bridges that will replace existing bridges while accommodating existing traffic. These bridges will not be completed until after 2005, depending on the final traffic handling conditions.

	<u>Contract Delivered</u>	<u>Retrofit Completed</u>	<u>Total Capital Planned</u>	<u>Percent Awarded *</u>	<u>Total Planned**</u>
Program Dollars (Dollars in Millions)	\$ 776	\$ 630	\$ 913	85%	\$ 1,350

* measure of retrofit contracts, excluding mitigation contracts

** Includes support cost

	<u>Contract Delivered</u>	<u>Retrofit Completed</u>	<u>Total Planned</u>	<u>Percent Completed</u>
Number of Bridges	1,141	1,136	1,155	98.4%

Local Seismic Retrofit Program:

- The Streets and Highways Code identifies the Department, Los Angeles County, and Santa Clara County as lead agencies for the local seismic retrofit program. Lead agencies are responsible for assessing the need for seismic retrofit work on non-State, publicly owned bridges and identifying required retrofit work. Each bridge owner is responsible for securing environmental approvals, right-of-way clearances, and administering construction contracts. A combination of Federal and State funding is used to fund these projects through the Department's Local Assistance programs.
- The Department as lead agency: (73 percent of local program) Out of a total of 903 bridges, 284 are being evaluated, 192 are in design, 94 are under construction, 220 are complete and 113 do not require retrofit.
- Los Angeles as lead agency: (24 percent of Local Program) Out of a total of 293 bridges, 16 are being evaluated, 84 are in design, 11 are under construction, 129 are complete and 53 do not require retrofit.
- Santa Clara as lead agency: (3 percent of Local Program) Out of a total of 38 bridges, two are being evaluated, two are in design, none are under construction, 25 are complete and nine do not require retrofit.
- Total Local Agency Program: Out of a total of 1,234 bridges, 302 (24 percent) are being evaluated, 278 (23 percent) are in design, 105 (9 percent) are under construction, 374 (30 percent) are complete and 175 (14 percent) do not require retrofit.

Toll Bridge Seismic Retrofit Program:

The toll bridges are the largest and most complicated bridges in the State. Nowhere in the world have bridges as complex as these been seismically retrofitted. Variable soil types and foundations, seismic forces ten times the original design forces, aged structures, heavy traffic volumes, conflicts with utilities, air space concerns, handling of hazardous waste, and care to protect sensitive aquatic, cultural, and historical resources all contribute to the difficulty in retrofitting these structures. Based upon the hazard and vulnerability studies and the Seismic Advisory Board's input, the Department determined that the following seven of the nine State-owned toll bridges would undergo seismic retrofit:

Bay Area Toll Bridges:

- San Francisco-Oakland Bay Bridge (West Span)
- Benicia-Martinez Bridge
- Carquinez Bridge (Eastbound)
- Richmond-San Rafael Bridge
- San Mateo-Hayward Bridge

Southern California Toll Bridges:

- Vincent Thomas Bridge
- San Diego-Coronado Bridge

In addition to retrofitting the above existing structures, replacement was deemed to be the most cost-effective, long-term retrofit strategy for two bridges:

- The San Francisco-Oakland Bay Bridge East Span
- The Westbound Carquinez Bridge [funded by the Bay Area Toll Authority (BATA) using Regional Measure 1 toll funds] (Streets and Highways Code Section 30913)

Program Funding

AB 1171 establishes funding in the amount of \$4.637 billion to retrofit the State's toll bridges. The funding includes \$2.620 billion previously provided by statute and additional fund sources totaling \$2.017 billion. The following table summarizes the AB 1171 funding. Of the State's share shown in the table below, \$795 million of State Highway Account (SHA) funds and \$80 million of Public Transportation Account funds were programmed in the 2002 Fund Estimate for the State Transportation Improvement Program (STIP). The decision to use \$642 million of Federal Highway Bridge Restoration Rehabilitation (HBRR) funds was part of AB 1171, which passed after the 2002 Fund Estimate was adopted. The Highway Bridge Restoration Rehabilitation funds will be included in the 2004 Fund Estimate.

AB 1171 also authorized the Department to utilize up to \$448 million of the State Highway Account funds to mitigate any cost increases above the \$4.637 billion budgeted program cost estimate if needed.

AB 1171 Toll Bridge Seismic Retrofit Program Funding (Dollars in millions)	
Fund Source	Amount
Proposition 192	\$790
Regional Share	
Bay Area Surcharge Revenues	\$2,282
San Diego Association of Governments (SANDAG) Contribution	\$33
Vincent Thomas Bridge Contribution	\$15
State's Share	
State Highway Account	\$795
Public Transportation Account	\$80
Federal Highway Bridge Replacement and Rehabilitation (HBRR)	\$642
Total	\$4,637

AB 1171 provides authority for bond financing as well as for the utilization of federal funds raised through a direct loan or a line of credit. Pursuant to the provisions of AB 1171, the Department submitted a loan application to the Federal Highway Administration (FHWA), Transportation Infrastructure Finance Innovation Act of 1998 (TIFIA) Joint Program Office (JPO); this loan application was approved on December 18, 2001. The finance plan presented in the Transportation Infrastructure Finance Innovation Act application included the use of \$642 million of Highway Bridge Restoration Rehabilitation funds, \$925 million from issuance of revenue bonds, and up to a \$450 million Direct Loan through the Transportation Infrastructure Finance Innovation Act program.

Revenues and Expenditures

The Program's financial status as of December 2002 is summarized in the table below. The information includes the surcharge revenues collected, funds transferred from the State Highway Account and Public Transportation Account to the Toll Bridge Seismic Retrofit Account (TBSRA), and expenditures from the Toll Bridge Seismic Retrofit Account and Proposition 192.

Toll Bridge Seismic Retrofit Program Financial Status As of December 2002 (Dollars in millions)	
Revenues:	
♦ Toll Surcharge	\$604.9
♦ SMIF Interest	54.1
♦ Bond Revenue	790.0 ^a
♦ SANDAG	33.0 ^b
♦ Vincent Thomas	6.5
Transfers to TBSRA:	
♦ State Highway Account	354.6
♦ Public Transportation Account	10.0
Total Revenues and Transfers	\$1,853.1
Expenditures:	
♦ Capital Outlay	\$1,038.6
♦ State Operation	443.6
Subtotal Program Expenditures	\$1,482.2
Encumbrances, Not Expended:	
♦ Capital Outlay	\$1,403.8
♦ State Operations	11.3
Subtotal Encumbrances, Not Expended	\$1,415.1
Total Encumbrances and Expenditures	\$2,897.3
^a Fully allocated by California Transportation Commission. ^b Contribution fulfilled in June 2001.	

Total revenues and transfers through December 2002 represent actual cash receipts deposited into the accounts dedicated to the TBSRP. Revenues shown do not include anticipated financing based on the Financial Plan approved for the program.

Total encumbrances and expenditures are based on total commitments to date including all awarded contracts. Actual receipts are currently less than total amount of expenditures and encumbrances because the TBSRP is funded on a cash-flow basis. Bonds and loans authorized through AB 1171 will be issued as cash expenditures utilize available cash on hand, consistent with the approved Financing Plan.

Cost Estimate

The table below compares the AB 1171 project budgets to the current estimates.

Comparison of AB 1171 and December 2002 Cost Estimates (Dollars in millions)		
Bridge	AB 1171	December 2002
Benicia-Martinez Existing*	\$ 190	\$ 183
Carquinez (eastbound)**	\$ 125	\$ 122
Richmond-San Rafael	\$ 665	\$ 665
San Diego-Coronado	\$ 105	\$ 106.7
Vincent Thomas	\$ 62	\$ 61.7
San Mateo-Hayward	\$ 190	\$ 170
Bay Bridge – New East Span	\$ 2,600	\$ 2,953
Bay Bridge – West Span	\$ 700	\$ 670
Subtotal	\$ 4,637	\$ 4,931
Contingency***	\$ 448	\$ 154
Total	\$ 5,085	\$ 5,085

* This seismic retrofit project is separate from the Bay Area Toll Authority Regional Measure 1 new toll bridge project currently under construction, which is not part of this seismic retrofit program.

** The westbound Carquinez Bridge is to be replaced by Regional Measure 1.

*** AB 1171 authorized the Department to utilize up to \$448 million of the State Highway Account funds to mitigate any cost increases above the \$4.637 billion budgeted program cost estimate if needed.

The cost estimates were developed using the best available information based on contract award and construction status. The toll bridges are the largest and most complicated structures in the State; nowhere in the world have bridges as complex been designed or built to today's high seismic standards. In updating both cost and schedule many risks have been identified. The new Bay Bridge east span is sufficiently unique that traditional public works estimating metrics do not apply. Contractors and transportation partners confirm that seismic construction strategies are being employed at scales never before used.

Progress

Seismic retrofit work has been completed on five of the seven bridges. The seismic safety projects for the Vincent Thomas and San Mateo-Hayward bridges were completed in 2000. The seismic retrofit of the eastbound Carquinez Bridge was completed in 2001, while the seismic retrofit projects of the Benicia-Martinez and San Diego-Coronado bridges were completed in 2002. Construction contracts have been awarded on all seven bridges. The status of bridges under construction are outlined below:

RICHMOND-SAN RAFAEL BRIDGE SEISMIC RETROFIT

Background: Completed in 1956, the Richmond-San Rafael Bridge is part of Interstate 580, spanning between the city of Richmond (Contra Costa County) and Point San Quentin (Marin County). The 4.5-mile long bridge, due to the structural inadequacies in its various portions, is vulnerable to a major earthquake.

Schedule/Cost: This project was awarded in October 2000, and construction will be complete in late 2005. The total project cost estimate is \$665 million.

San Francisco-Oakland Bay Bridge – East Span Replacement

Description: A new bridge will replace the existing east span of the Bay Bridge across the Central San Francisco Bay between Yerba Buena Island and the Oakland Mole. The new bridge will be built on an alignment to the north of the existing bridge. The new bridge will be approximately 12,000 feet long and approximately 230 feet wide, including the space between the eastbound and westbound bridge decks. It will provide five mixed-flow traffic lanes that will each be 12 feet wide and two shoulders that will each be 10 feet wide in each direction of travel. On the south side of the eastbound deck, a 15,434 feet foot bicycle/pedestrian path will be constructed 1 foot above the roadway and be separated from traffic by the roadway shoulder, a concrete barrier, and a railing. The bicycle/pedestrian path will extend from the Oakland Mole to the western terminus of the bridge at YBI.

The new east span will be constructed in three major sections: 1) Yerba Buena Island Transition and Self-Anchored Suspension (YBI-SAS) Span; 2) Skyway and 3) Oakland Approach/Touchdown. A demolition contract will be utilized to remove the existing bridge, following construction and the transfer of traffic onto the east span. The construction of the YBI transition and SAS span was originally combined into one contract – the YBI and SAS contract. The contract limits of this section of the new bridge are in San Francisco and Alameda counties, in San Francisco and Oakland, from YBI to the east-end of the SAS section. To increase competition among contractors and encourage Disadvantaged Business Enterprise participation, the original YBI-SAS contract was divided into eight smaller contracts.

East Span Schedule: The westbound direction of the new facility is scheduled to open to traffic in late 2006, with the eastbound direction open in late 2007. Recent factors incorporated:

- Steel industry capacity and economic analysis studies in 2002 provided a final review of fabrication and erection timelines required to build the SAS tower and decks.
- Economic conditions and bond market changes in 2002 have affected the construction industry.

East Span Cost Estimate: The current cost estimate for the new east span is \$ 2.953 billion, remaining within the AB 1171 authorized contingency. This cost estimate for the new east span includes all costs incurred to date. The estimate includes: escalation, cost of engineering, environmental document, numerous extra studies, design costs, right-of-way, utilities, environmental mitigation, interim retrofit, cost of original retrofit design (sunk costs), actual and anticipated construction bids, and appropriate contingencies to address potential construction issues considered to date.

The potential for reduced competition and increased costs on large public works contracts since September 11, 2001 became evident during 2002. Events have impacted long duration large-scale projects regarding ability to bond and obtain insurance. The Skyway contract was awarded in 2002 impacting east span project costs by \$312 million over that contract's cost estimate partially due to bond market issues and construction industry capacity.

In order to stay within program budget after the Skyway contract award, project contingencies and anticipated cost reductions were redistributed to fund the \$312 million. Since then, as more Yerba Buena Island (YBI) transition and Self-Anchored Suspension (SAS) span contracts are delivered for advertising, updated cost estimates are increasing based on current market information and final design.

The cost estimate increase of the Bay Bridge new east span is due to various factors:

- Construction bonding and insurance market changes since 2001 have resulted in reduced capacity available to handle current payment bonding requirements and higher rates to assume risks on large complex projects (over \$250 million).
- Steel industry capacity and economic changes in 2002 have resulted in fluctuations in supply and demand that have impacted both domestic and international markets for steel production and steel fabrication, particularly for large scale assembly and delivery.
- Contractor and construction industry feedback in 2002 during numerous business outreaches and final design constructability reviews resulted in potential bidders providing updated knowledge of resources such as labor, equipment, and materials that warranted revisions to cost and schedule estimates reflective of current market conditions.
- Final structural design development during 2002 resulted in cost estimate changes greater than preliminary design contingencies for this marine construction project. As the self-anchored suspension superstructure design was finalized, particularly the unique steel tower and orthotropic box deck sections, contract item quantities and cost estimates were updated based on Bay Area and national trends for major bridge projects requiring special steel fabrication, pile installation permit restrictions, potential long distance shipping, and federal marine equipment restrictions.

It is important to note that estimating cost and schedule on this project has presented a level of complexity with a unique set of challenges. It is difficult to ascertain how the marketplace will evaluate a project of this scale, resulting in potentially less competition among bidders and a high bid amount.

In updating both cost and schedule, many risks have been identified that produce a greater degree of uncertainty due to the recognized fact that the new Bay Bridge east span is sufficiently unique, such that traditional public works estimating metrics do not apply. Contractors and transportation partners confirm that seismic construction strategies are being employed at scales never before used.

San Francisco-Oakland Bay Bridge – West Span and Approach

Description: The seismic work on the west span includes retrofitting the west span and replacing the West Approach. The west span consists of twin, end-to-end suspension bridges and a three span continuous truss structure at the San Francisco end of the bridge. From this structure, the West Approach, a double-deck concrete structure on land, extends west to approximately 5th Street.

Schedule/Cost: The retrofit work on the west span will be complete in winter 2003. The current cost estimate to retrofit the west span is \$300 million. Bids for replacing the west approach were opened in November 2002. The apparent low bid was \$18 million below the Engineer's Estimate; the bid results are being evaluated. The West Approach replacement is scheduled to be complete in spring 2009. The current project cost estimate is \$370 million.

Summary

The Department is making significant progress in retrofitting the State's toll bridges. Even with the economic changes following the incidents of September 11, 2001, AB 1171 provides the necessary funding for the Program, including the Metropolitan Transportation Commission's selected new east span.

- By the end of the 2002/2003 fiscal year, the total completed and work under contract, including capital outlay support expenditures, will be approximately \$4 billion, or 80% of the Program funding.
- The Department has moved forward in implementing the Bay Area's desires as communicated by Metropolitan Transportation Committee by awarding the new east span Skyway contract in 2002 and advertising in February 2003 the "signature" self-anchored suspension superstructure contract.